03 30 00 • CONCRETE

SECTION INCLUDES

Cast-In-Place Concrete
Vapor Barrier under Slabs
Architectural Precast Concrete
Concrete Repair

RELATED SECTIONS

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CAST-IN-PLACE CONCRETE

MATERIALS

Provide structural concrete as per code and engineering requirements. The following classes of concrete are recommended:

Foundations, basements walls, slabs not exposed to weather	3,000 psi
Foundations, basements walls, slabs exposed to weather	3,500 psi
Driveways, slabs, sidewalks, porches, patios, steps exposed to weather	4,000 psi

Types:

- ❑ Type I, IA Residential work
- ❑ Type II, IIA Soils or ground water contains sulfates
- ❑ Type IIIA Cold weather use when freezing is a risk

Air entrainment for concrete exposed to weather should be 4% to 7%, typicallly 5%

Admixtures shall be employed only when necessary for use in a particular concrete, and they shall be in accordance with manufacturer's instructions.

Admixtures shall comply with ASTM C 494 and are classified as follows:

Type A	Water-reducing
Type B	Retarding
Type C	Accelerating
Type D	Water-reducing and retarding
Type E	Water-reducing and accelerating
Type F	High range water-reducing
Type G	High range water-reducing and retarding

The use of chloride-containing admixtures is prohibited because it can cause detrimental effects on embedded metals and degradation of concrete structures.

Where removable formwork is used, specify a biodegradable form release agent.

Specify standard ready-mix concrete for which historical performance data is available.

The Designer and DHCD Construction Advisor will determine the extent of testing. If testing is necessary it will be per the requirements of the Designer, and paid for by the LHA.

DESIGN

Standards:

All cast-in-place concrete shall comply with the following standards:

- ACI 302, "Recommended Practice for Concrete Floor and Slab Construction"
- ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete"
- ACI 305, "Recommended Practice for Hot Weather Concreting"
- ACI 306, "Recommended Practice for Cold Weather Concreting"
- ACI 309, "Consolidation of Concrete"
- ACI 315, "Recommended Practice for Detailing Reinforced Concrete Systems"
- ACI 614, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete"
- CRSI, "Reinforced Concrete - A Manual of Standard Practice"

Mix designs shall be submitted to the Designer for approval prior to placing

Concrete Finishes:

- Smooth troweled finish: shall be provided where concrete flatwork is to be exposed work or is to receive resilient flooring materials.
- Floated finish: shall be provided where concrete flatwork is to receive waterproofing membranes or setting beds for finished materials.
- Floated finish: shall be provided for top surfaces of walls, slabs and beams
- Broom Finish, transverse direction (with smooth edging): shall be provided at exterior concrete walks, pavements and steps.
- HC Ramps: broom finish, parrallel to pitch to facilitate water run-off.

Minimum interior slab thicknesses: 4" is industry standard, with 6" for garages.

Provide a concrete sealer to exposed edges of slabs on grade.

Coordinate the design and documentation of foundation drainage systems.

Allowed tolerances for slab levelness: 1/4 inch over 10 feet typical, 1/8 inch over 10 feet for new wood flooring.

For New Slabs at Existing Basement Floors:

- ❑ New fully bonded slab over existing concrete: use overlay toppings 1"-2" thick (Self-Leveling Concrete), such as:

  Sikaset by Sika
  ARdex K-15 by Ardex
  Bonsal Self Leveling Wear Toping by W.R. Bonsal
  or conventional concrete (low slump, high sand, small aggregate)

  Do not use gypsum-based products.

- ❑ New unbonded concrete floor slab over the existing floor slab: provide a polyethelene bondbreaker

For Crawl Space Floors:

- ❑ Provide "rat slab" (3" average depth over polyethelene vapor barrier)

EXECUTION

Turn over a copy of all concrete delivery slips to the project representative.

If piles are required, the work must be done under the observation of the Owner's approved testing lab.

Power troweling is a recommended finishing technique.

VAPOR BARRIER & INSULATION UNDER SLAB

MATERIALS

Acceptable materials include 6 mil thick polyethylene, or cross laminated, 4 mil thick polyethylene (such as Sto-Cote Products Model Tu-Tuf 4).

All slabs should be completely insulated with 2" of rigid extruded polystyrene with 25-30 psi compressive strength.

EXECUTION

All seams should be overlapped 6 to 8 inches.

Rigid insulation should be tongue and groove with and joints butted tightly.

ARCHITECTURAL PRECAST CONCRETE

DESIGN

Precast concrete is a good choice for sills, copings, and other architectural elements that are part of new masonry wall construction. In existing older buildings which use stone for these elements, consider the use of cast-stone products in cases where precast units cannot match the existing construction.

Precast elements should be thoroughly designed, sized, and scheduled to facilitate construction coordination and improve overall quality.

Precast stair treads are not acceptable

Provide positive slopes away from the building envelope on all horizontal surfaces exposed to weather.

Standards:

- ACI 318, Building Code Requirements for Reinforced Concrete
- CRSI Manual of Standard Practice
- PCI MNL 117, Manual of Quality Control for Plants and Production of Architectural Precast Concrete Products Manual
- Design Mix: 5000 psi, 28 day compressive strength, 4 to 6 percent air content.

EXECUTION

Require samples, and Include precast elements as part of masonry sample panels.

The concrete batch plant, and installer fabricator should be PCI certified.

PATCHING CONCRETE, CONCRETE REPAIR

DESIGN

For cracks in walls and slabs:

Repair should not be undertaken until cause of cracking has been determined. Structural repair, or new drainage systems may be required.

For wall cracks, options are:

- Conventional grouting systems:
  - Portland cement with or without acrylic admixtures for bond
  - proprietary "dry-pack" mixtures
  - hydraulic cements : will prevent water penetration
  - fiber reinforced cements : "surface bonding" cements.
- Epoxy injections: an advanced technique to restore structural soundness
- Urethane grout injections: good when there is substantial seepage through the wall. These are costly, state of the art products used in critical situations where there is sturctural movement and water penetration. Products by: 3M Co., Green Mountain International, Prime Resins, De Neef Co.

For general concrete repair, options are:

- ❑ Spall repair by low pressure spraying: for large scale repairs
- ❑ Surface repair: form and pour techniques, which are most often used

For Stair repairs, options are:

- ❑ Resurface Concrete (to repair damage from flaking scaling, etc.) Apply a thin cement overlay system: includes a preliminary application of patching compound for holes followed by a thin coat as a resurfacer. Products such as: A-300 Pourable Outdoor Concrete Topping, Ardex Engineered Cements

- ❑ Repair or Replace Steps:
  - Preparation is a key component of repair process. Enlarge and clean damaged area, apply bonding agent.
  - For cracks: concrete patching compound or expansive mortar may be used.
  - Use hydraulic concrete if there are signs of water seepage.
  - For damaged nosings, use form boards and new concrete.
  - For stair conrners, and difficult areas use latex based ready-mix or a sand-cement-epoxy-mix.

Standards

- ❑ ICRI guidelines NO 03732 Selecting and Specifying Materials for the Repair of Concrete Surfaces.

- ❑ ICRI guidelines NO 03732 Selecting and Specifying concrete Surface preparation for Sealers Coatings and Overlays

EXECUTION

Require sample areas of repair.

Preconstruction meetings are essential to review repair techniques.

Third party inspectors or clerks or the works are advisable.